



Dolby Vision Streams Within the ISO Base Media File Format Version 2.1.2

Specification

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Notices

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Introduction


This documentation specifies the required data structures for storage of Dolby Vision streams in a file format compliant with the ISO base media file format.

Example file formats derived from the ISO base media file format include the Digital Entertainment Content Ecosystem (DECE) Common File Format (CFF), Protected Interoperable File Format (PIFF), and MP4 file format.

- [Dolby Vision encoding](#)
- [Dolby Vision stream cross compatibility](#)
- [New in this version](#)
- [Standards and Dolby documentation](#)
- [Contacting Dolby](#)

1.1 Dolby Vision encoding

Dolby Vision video content can be encoded in one single layer or two separate layers, along with Dolby Vision metadata. Both schemes allow the format to deliver more dynamic range and a wider color gamut, and provide cross-compatibility with standard dynamic range (SDR) and HDR10 in some cases.

 **Note:** Profile 4 is the only dual-layer profile that uses the ISO base media file format (ISO BMFF) for content delivery and that has not been deprecated; however, it is not supported for new applications by service providers. Although the profile 7 Blu-ray application relies on content delivery with transport streams, there are use cases during content creation that benefit from use of profile 7 playback from ISO BMFF files on TVs during quality control testing of Blu-ray content.

When encoded using the single-layer scheme, the Dolby Vision stream consists of the base layer and reference processing unit and is either encoded in one 10-bit High-Efficiency Video Coding (HEVC) elementary stream or one 8-bit Advanced Video Coding (AVC) elementary stream (as defined in ISO/IEC 14496-10, ISO/IEC 14496-15, and ISO/IEC 23008-2). The base layer in this case may be either SDR or HDR compliant; certain single-layer schemes offer cross compatibility, and others do not.

When encoded using the dual-layer scheme, the Dolby Vision stream consists of a base layer, an enhancement layer, and a reference processing unit:

- The base layer may or may not be SDR or HDR compliant (that is, compliant with ITU-R Recommendation BT.709 [ITU-R BT.709] or BT.2100 [ITU-R BT.2100] standards, respectively). When compliant with ITU-R BT.709 or ITU-R BT.2100 standards, the base layer offers cross-compatibility, allowing playback of Dolby Vision streams from SDR- or HDR-compliant devices that do not support Dolby Vision.
- The enhancement layer carries the color and brightness differences between the graded source (that is, a source that is graded to Dolby Vision standards) and base-layer version of the source.
- The reference processing unit is a special Network Abstraction Layer (NAL) unit that contains the Dolby Vision metadata. It is also a complete Dolby Vision metadata access unit for the current picture.
- For a dual-layer Dolby Vision stream, these layers are encoded in either one or two video elementary streams.

For detailed information, refer to *Dolby Vision Profiles and Levels* and the *Dolby Vision Video Elementary Stream Multiplexing Specification*.

1.2 Dolby Vision stream cross compatibility

Certain types of Dolby Vision streams can carry SDR or HDR signals to be played back with a device that does not support Dolby Vision.

SDR signal

An ITU-R BT.709 signal with peak luminance of up to 100 cd/m².

HDR signal

An ITU-R BT.2100 signal with peak luminance of usually up to 1000 cd/m², and potentially up to 4,000 cd/m².

An SDR- or HDR-compliant Dolby Vision stream contains a base layer that is decodable by an AVC or HEVC compliant decoder. The base layer has a nonzero value for the base layer signal compatibility ID and is compliant with ISO/IEC 14496-10, ISO/IEC 14496-15, and ISO/IEC 23008-2. The output of the decoder is an SDR or HDR signal compliant with a particular set of standards, as defined in the *Dolby Vision Profiles and Levels* specification.

A non-SDR or non-HDR base layer is decodable by a Dolby Vision enabled AVC or HEVC decoder. The base layer has a zero value for the base layer signal compatibility ID and is compliant with ISO/IEC 14496-10, ISO/IEC 14496-15, and ISO/IEC 23008-2. The output of the decoder is a non-SDR or non-HDR signal that is not compliant with any standard.

1.3 New in this version

Updates have been made to the latest version of this documentation.

For v2.1.2, the changes include:

- Moving information related to dual-track to a new *Annex*
- Providing clarifications related to single-layer and dual-layer
- Clarifications related to `dv_version_major` and `dv_version_minor`
- Making editorial and structural changes to improve usability

1.4 Standards and Dolby documentation

Standards and Dolby documentation provide additional information to assist you in designing your product.

Standards

- ISO/IEC 14496-12:2015, *Information Technology—Coding of Audio-Visual Objects, Part 12: ISO Base Media File Format*, available from <http://www.iso.org>. This documentation is Part 12 of the MPEG-4 specification and describes storage of content in a media file.
- ISO/IEC 14496-15:2017, *Information Technology—Coding of Audio-Visual Objects, Part 15: Carriage of Network Abstraction Layer (NAL) Unit Structured Video in ISO Base Media File Format*, available from <http://www.iso.org>
- ISO/IEC 14496-10:2009, *Information Technology—Coding of Audio-Visual Objects, Part 10: Audio*, available from <http://www.iso.org>.
- ISO/IEC 14496-15:2017, *Amendment 2*, 2019-01, *Information Technology—Coding of Audio-Visual Objects, Part 15: Carriage of Network Abstraction Layer (NAL) Unit Structured Video in ISO Base Media File Format*, available from <http://www.iso.org>
- ISO/IEC 23008-2:2017, *Information Technology—High Efficiency Coding and Media Delivery in Heterogeneous Environments, Part 2: High Efficiency Video Coding*, available from <http://www.iso.org>.
- ITU-R BT.709, *Parameter Values for the HDTV Standards for Production and International Program Exchange*, available from <http://www.itu.int>
- ITU-R Recommendation BT.2100, *Image Parameter Values for High Dynamic Range Television for Use in Production and International Program Exchange*, available from <http://www.itu.int>.
- ETSI TS 102 366 v1.4.1 (2017), *Digital Audio Compression (AC-3, Enhanced AC-3) Standard*, Annex H (normative), available from <http://www.etsi.org>.
- ETSI TS 102 366 v1.4.1 (2017), *Digital Audio Compression (AC-3, Enhanced AC-3) Standard, HDR Signaling and Carriage of Dynamic Metadata for Colour Volume Transform; Application #1 for DVB compliant systems*, available from <http://www.etsi.org>.
- HDMI 2.1, *High-Definition Multimedia Interface Version 2.1*, available from <http://www.hdmi.org>.

Dolby documentation available to Licensees or in public domain

- *Dolby Vision Video Elementary Stream Multiplexing Specification* (*dovi_proenc_ves_muxing_spec.pdf*), available to Licensees and located in the documentation package of the kit.
- *Dolby Vision Consumer Decoder Specification*, version 1.1, available to Licensees and located in the documentation package of the kit.
- *Dolby Vision Profiles and Levels*, version 1.3.2 or later, available on Dolby.com and available to Licensees in the documentation package of the kit.

1.5 Contacting Dolby

Support services are available to address any questions and to provide advice about integrating Dolby technology into your product.

For product design or testing, contact Dolby at systemsupport@dolby.com. By utilizing Dolby expertise, especially during the design process, many problems that might require design revisions before a product is approved can be prevented.

Dolby is also available to review product plans, including preliminary design information, markings, displays, and control and menu layouts, with the goal of preventing problems early in the product development cycle.

If you have comments or feedback about this documentation, send us an email at documentation@dolby.com.

Boxes for signaling Dolby Vision streams in ISO base media file format

Dolby Vision streams are encoded as regular AVC or HEVC streams. In addition to AVC or HEVC boxes, Dolby Vision specific information is signaled using additional boxes specified for Dolby Vision.

- [Box hierarchy overview](#)
- [Dolby Vision configuration boxes](#)
- [Dolby Vision enhancement-layer AVC and HEVC configuration box](#)
- [Dolby Vision sample entries](#)
- [Dolby Vision AVC-compatible sample entry](#)
- [File-type box](#)

2.1 Box hierarchy overview

An ISO base media file that contains a Dolby Vision stream is expected to be structured conforming to this documentation.

This table lists all possible boxes that can be used for signaling a Dolby Vision stream and shows an overall view of the box encapsulation structure; indentation is used to show containment. The boxes that must be included in the sample description box (stsd) are determined by the configuration of the Dolby Vision stream.

Table 1: Box hierarchy overview

Nesting level			
4	5	6	7
stbl			
	stsd		
		One of: <ul style="list-style-type: none"> DolbyVisionAVC3SampleEntry (dvav) DolbyVisionAVC1SampleEntry (dva1) DolbyVisionHEV1SampleEntry (dvhe) DolbyVisionHVC1SampleEntry (dvh1) DolbyVisionAVCCompatibleSampleEntry (avc1) DolbyVisionAVCCompatibleSampleEntry(avc3) AVC2SampleEntry (avc2) AVC2SampleEntry (avc4) AVCSampleEntry (avc1) AVCSampleEntry (avc3) HEVCSampleEntry (hev1) HEVCSampleEntry (hvc1) 	
			One of: <ul style="list-style-type: none"> AVC configuration box (avcC) HEVC configuration box (hvcC)
			One of: <ul style="list-style-type: none"> Dolby Vision configuration box (dvcC) Dolby Vision configuration box (dvvc)
			Provided AVC or HEVC and dual-layer profile, one of: <ul style="list-style-type: none"> Dolby Vision enhancement-layer AVC configuration box (avcE) Dolby Vision enhancement-layer HEVC configuration box (hvcE)
	stts		
	stsc		
	stsz		

Table 1: Box hierarchy overview (continued)

Nesting level			
4	5	6	7
	stz2		
	stco		
	co64		

Note: `DolbyVisionAVCCompatibleSampleEntry(avc1)` and `DolbyVisionAVCCompatibleSampleEntry(avc3)` are an extensions of `AVCSampleEntry(avc1)` and `AVCSampleEntry(avc3)`. These two boxes carry everything contained in the `AVCSampleEntry(avc1)` or `AVCSampleEntry(avc3)` box, respectively, as well as the Dolby Vision configuration box (`dvcC` or `dvvC`) and Dolby Vision enhancement-layer AVC configuration box (`avcE`). Using `avc1` or `avc3` allows you to extend the box while retaining the same FourCC sequence.

In the table, the value of the nesting level provided for each box is based on the structure of the complete ISO base media file, beginning with a nesting value of 0 for the `ftyp` and `moov` boxes.

2.2 Dolby Vision configuration boxes

An ISO base media file that carries a Dolby Vision stream must contain boxes that signal the configuration information about the contained Dolby Vision stream. The configuration information is required to initialize the Dolby Vision decoder.

Definition

Box type	For profiles less than and equal to 7: <code>dvcC</code> For profiles greater than 7: <code>dvvC</code>
Possible container	One of: ^[a] <ul style="list-style-type: none"> • <code>DolbyVisionAVC3SampleEntry(dvav)</code> • <code>DolbyVisionAVC1SampleEntry(dva1)</code> • <code>DolbyVisionHEV1SampleEntry(dvhe)</code> • <code>DolbyVisionHEV1SampleEntry(dvh1)</code> • <code>DolbyVisionAVCCompatibleSampleEntry(avc1 or avc3)</code> • <code>AVC2SampleEntry(avc2 or avc4)</code> • <code>HEVCSampleEntry(hev1 or hvc1)</code>
Mandatory	Yes
Quantity	Exactly one

[a] The correct visual sample entry to use depends on the configuration of the Dolby Vision stream.

Syntax

The syntax of the Dolby Vision configuration box is shown here.

```
align(8) class DOVIDecoderConfigurationRecord
{
    unsigned int (8)          dv_version_major;
    unsigned int (8)          dv_version_minor;
    unsigned int (7)          dv_profile;
    unsigned int (6)          dv_level;
    bit (1)                   rpu_present_flag;
    bit (1)                   el_present_flag;
    bit (1)                   bl_present_flag;
    unsigned int (4)          dv_bl_signal_compatibility_id;
    const unsigned int (28)   reserved = 0;
    const unsigned int (32)[4] reserved = 0;
}

class DOVIConfigurationBox extends Box('dvcC' or 'dvvC')
{
    DOVIDecoderConfigurationRecord() DOVIConfig;
}
```

Note:

Devices that do not recognize a particular Dolby Vision box type, or the value for an element of the `DOVIDecoderConfigurationRecord` (such as `dv_profile` or `dv_level`), must ensure that they handle the stream properly based on the codec configuration box, as specified in ISO/IEC 14496.

Semantics

The semantics of the Dolby Vision configuration box are described here.

`dv_version_major`

Specifies the major version number of the Dolby Vision specification that the stream complies with. For a stream compliant with new features of this specification, set the value to 2; otherwise, the value may remain set to 1.

Note: Dolby Vision streams compliant with this specification may, or may not, be compatible with earlier Dolby Vision devices; Dolby Vision streams compliant with earlier versions of this specification are playable on devices built to this specification.

`dv_version_minor`

Specifies the minor version number of the Dolby Vision specification that the stream complies with. For a stream compliant with new features of this specification, set the value to 1; otherwise, the value may remain set to 0.

`dv_profile`

Specifies the Dolby Vision profile. Valid values are Dolby Vision bitstream profile IDs as defined in *Dolby Vision profiles and levels*.

`dv_level`

Specifies the Dolby Vision level. Valid values are Dolby Vision level IDs as defined in *Dolby Vision profiles and levels*.

`rpu_present_flag`

For a track that contains the reference picture unit substream, set the value to 1.

Note: This flag must always be set to 1 given the deprecation of certain profiles.

`el_present_flag`

For a track that contains the enhancement layer substream, set the value to 1. Set the value to 0 for Dolby Vision profiles that do not contain the enhancement layer.

bl_present_flag

This flag must always be set to 1 to indicate presence of a base layer substream in a track.

dv_bl_signal_compatibility_id

Specifies a particular form of a base layer substream that can be decoded to a signal compliant with a particular set of standards, if any. For detailed information about compatibility IDs, see *Dolby Vision profiles and levels*.

This field provides information that can be used for debugging and testing.

dv_bl_signal_compatibility_id may be used to identify assets to encoders during content creation and to manage assets during content distribution. A decoder behavior is not dependent on these Dolby Vision defined IDs.

2.3 Dolby Vision enhancement-layer AVC and HEVC configuration box

The Dolby Vision enhancement-layer AVC configuration box (DolbyVisionELAVCConfigurationBox) and HEVC configuration box (DolbyVisionELHEVCConfigurationBox) extend the AVC and HEVC configuration boxes, respectively, to signal the Dolby Vision enhancement-layer substream information.

Note that the configuration box applies only to Dolby Vision profile 4, and as an option, profile 7 files used for quality control purposes during content creation.

Definition

Box type	avcE or hvcE
Possible container	One of: ^[a] <ul style="list-style-type: none"> • DolbyVisionAVC3SampleEntry (dvav) • DolbyVisionAVC1SampleEntry (dva1) • DolbyVisionHEV1SampleEntry (dvhe) • DolbyVisionHVC1SampleEntry (dvh1) • DolbyVisionAVCCompatibleSampleEntry (avc1 or avc3) • AVC2SampleEntry (avc2 or avc4) • HEVCSampleEntry (hev1 or hvc1)
Mandatory	No
Quantity	Zero or one

[a] The correct visual sample entry to use depends on the configuration of the Dolby Vision stream.

Syntax

The syntax of the Dolby Vision enhancement-layer AVC configuration box is shown here.

```
class DolbyVisionELAVCConfigurationBox() extends Box('avcE')
{
    AVCDecoderConfigurationRecord() AVCConfig;
}
```

The syntax of the Dolby Vision enhancement-layer HEVC configuration box is shown here.

```
class DolbyVisionELHEVCConfigurationBox() extends Box('hvcE')
{
    HEVCDecoderConfigurationRecord() HEVCConfig;
}
```

2.4 Dolby Vision sample entries

An ISO base media file carrying a Dolby Vision stream that contains a non-SDR-compliant base layer must contain an appropriate Dolby Vision sample entry box.

Definition

Box type	One of: ^[a] <ul style="list-style-type: none"> • dvav (DolbyVisionAVC3SampleEntry) • dva1 (DolbyVisionAVC1SampleEntry) • dvhe (DolbyVisionHEV1SampleEntry) • dvh1 (DolbyVisionHVC1SampleEntry)
Possible container	stsd (sample description box).
Mandatory	Yes.
Quantity	One or more sample entries of the same box type may be present.

[a] The correct visual sample entry to use depends on the configuration of the Dolby Vision stream.

Syntax

The syntax of the Dolby Vision sample entries is shown here.

```
class DolbyVisionAVC3SampleEntry() extends AVCSampleEntry('dvav')
{
    DOVIConfigurationBox()          config;
    DolbyVisionELAVCConfigurationBox() ELConfig; // optional
}

class DolbyVisionAVC1SampleEntry() extends AVCSampleEntry('dva1')
{
    DOVIConfigurationBox()          config;
    DolbyVisionELAVCConfigurationBox() ELConfig; // optional
}

class DolbyVisionHEVCSampleEntry() extends HEVCSampleEntry('dvhe')
{
    DOVIConfigurationBox()          config;
    DolbyVisionELHEVCConfigurationBox() ELConfig; // optional
}

class DolbyVisionHVC1SampleEntry() extends HEVCSampleEntry('dvh1')
{
    DOVIConfigurationBox()          config;
    DolbyVisionELHEVCConfigurationBox() ELConfig; // optional
}
```

Semantics

A Dolby Vision AVC or HEVC sample entry contains:

- An AVC or HEVC configuration box (avcC or hvcC)
- A Dolby Vision configuration box (dvcC or dvvC)
- For AVC or HEVC, an optional Dolby Vision enhancement layer AVC or HEVC configuration box (avcE or hvcE)

The semantics of the Dolby Vision sample entries are described here.

config

This box specifies the base-layer configuration information. This information is required to initialize the Dolby Vision decoder.

ELConfig

This optional box specifies the enhancement-layer configuration information required to initialize the Dolby Vision decoder for the enhancement-layer substream.

Note that additional information is available in *Annex*.

Compressorname

As defined in ISO/IEC 14496-12:2015, *Compressorname* indicates the name of the compressor used for encoding. We recommend setting the value to `\013DOVI Coding`. `\013` is an octal representation of 11, indicating the length of the string *DOVI coding* (in bytes).

2.5 Dolby Vision AVC-compatible sample entry

The Dolby Vision AVC-compatible sample entry extends the AVC sample entry to contain a Dolby Vision configuration box (dvcC or dvvC). An ISO base media file carrying a Dolby Vision AVC stream that contains an SDR- or HDR-compliant base layer must use this box.

Definition

Box type	avc1 or avc3 (DolbyVisionAVCCompatibleSampleEntry).
Possible container	stsd (sample description box).
Mandatory	Yes.
Quantity	One or more sample entries of the same box type may be present.

Syntax

The syntax of the Dolby Vision AVC-compatible sample entry is shown here.

```
class DolbyVisionAVCCompatibleSampleEntry() extends AVCSampleEntry()
{
    DOVIConfigurationBox()          config;
    DolbyVisionELAVCConfigurationBox() ELConfig; //optional
}
```

Semantics

A Dolby Vision AVC-compatible sample entry contains:

- An AVC configuration box (avc1 or avc3)
- A Dolby Vision configuration box (dvcC or dvvC)

The semantics of the Dolby Vision sample entries are described here.

config

Specifies the configuration information required to initialize the Dolby Vision decoder for the base-layer substream encoded as an AVC elementary stream.

ELConfig

Specifies the configuration information required to initialize the Dolby Vision decoder for the enhancement-layer substream encoded as an AVC elementary stream.

Originally used to specify the configuration information to initialize the Dolby Vision decoder for the enhancement-layer substream encoded as an AVC elementary stream. At this point, this field is applicable only to profiles that are no longer being used for new applications, as noted in *Annex*.

Compressorname

Indicates the name of the compressor used for encoding. We recommend setting the value to `\013DOVI Coding`. `\013` is the octal notation for 11, representing the length of the string *DOVI coding* (in bytes).

2.6 File-type box

An ISO base media file that contains the Dolby Vision stream must indicate that the file complies with the Dolby Vision extensions by using the file-type box (ftyp).

In the file type-box (ftyp):

- Set the value of the `compatible_brands` field to `dby1`.
- Set the value of the `major_brand` field to the ISO-defined brand (for example, `iso6`).

Signaling a Dolby Vision stream in an ISO base media file

The Dolby Vision related boxes must be set correctly to signal the configuration of a Dolby Vision stream transported in a generic ISO base media file.

- [Dolby Vision stream multiplexing schemes](#)
- [Single-track ISO base media file](#)

3.1 Dolby Vision stream multiplexing schemes

A Dolby Vision stream can be transported in an ISO base media file format stream.

The base-layer, enhancement-layer (if available), and reference-processing-unit substreams are encoded and combined into a regular AVC, or HEVC elementary stream (using the transport stream system target decoder [T-STD] model). The resulting elementary stream is multiplexed on a single Dolby Vision track in ISO base media file format.

There are two types of Dolby Vision stream configuration: a dual-layer Dolby Vision stream and a single-layer Dolby Vision stream. A dual-layer Dolby Vision stream is composed of both the base-layer and enhancement-layer substreams and a reference-processing-unit substream. A single-layer Dolby Vision stream is composed of the base-layer and reference-processing-unit substreams only, without the enhancement layer. The presence of the enhancement-layer substream is dependent on the Dolby Vision profile.

A single-layer or dual-layer Dolby Vision stream can be multiplexed into a single track.

In either stream configuration, the base-layer substream is compliant with ISO/IEC 14496-10, ISO/IEC 14496-15, and ISO/IEC 23008-2 and decodable by an AVC or HEVC-compliant decoder. Depending on whether or not the output of the decoder is an SDR or HDR signal, a Dolby Vision stream can be defined as any of the following:

- An SDR- or HDR-compliant stream
- A non-SDR- or non-HDR-compliant stream

For detailed information about the multiplexing process, refer to the *Dolby Vision Video Elementary Stream (VES) Multiplexing Specification*.

3.2 Single-track ISO base media file

A Dolby Vision stream with either a single- or dual-layer configuration is multiplexed and transported on a single track in an ISO base media file.

3.2.1 Single-layer Dolby Vision stream

The base-layer and reference-picture-unit AVC or HEVC elementary substreams are multiplexed for transmission on a single ISO base media file track.

SDR- or HDR-compliant single-layer Dolby Vision stream in single track

Set up boxes to signal the single-track, single-layer Dolby Vision stream that contains the SDR- or HDR-compliant base layer.

- If the single-layer Dolby Vision stream is encoded in an HEVC-compatible elementary stream, include these boxes:
 - HEVC`SampleEntry` (hev1 or hvc1):
 - HEVC configuration box (hvcC).
 - Dolby Vision configuration box (dvcC or dvvC).
- If the single-layer Dolby Vision stream is encoded in an AVC-compatible elementary stream, include these boxes:
 - `DolbyVisionAVCCompatibleSampleEntry` (avc1 or avc3) or `AVC2SampleEntry` (avc2 or avc4):
 - AVC configuration box (avcC).
 - Dolby Vision configuration box (dvcC or dvvC).
- In the Dolby Vision configuration box (dvcC or dvvC), set these fields:
 - Set the `rpu_present_flag` field to 1.

- Set the `el_present_flag` field to 0.
- Set the `bl_present_flag` field to 1.
- Set the `dv_profile` field according to the encoded Dolby Vision profile. For valid values for this field, see *Dolby Vision profiles and levels*.
- Set the `dv_level` field according to the encoded Dolby Vision level. For valid values for this field, see *Dolby Vision profiles and levels*.

The locations and hierarchy of the boxes that must be included in the `stbl` box to signal the single-track Dolby Vision stream within an ISO base media file are listed in the table.


 **Note:** This table does not list the complete structure of the ISO base media file, which begins with nesting level 0.

Table 2: Sample table box hierarchy for a single-track, single-layer Dolby Vision file with SDR- or HDR-compliant base layer

Nesting level				Reference
4	5	6	7	
stbl				ISO/IEC 14496-12
	stsd			
		One of: <ul style="list-style-type: none"> • avc1 • avc3 • avc2 • avc4 • hev1 • hvc1 		
			One of: <ul style="list-style-type: none"> • avcC • hvcC 	
			One of: <ul style="list-style-type: none"> • dvcC • dvvC 	Dolby Vision configuration box
	stts			ISO/IEC 14496-12
	stsc			
	stsz			
	stz2			
	stco			
	co64			

If you need the ISO base media file to be compliant with DECE CFF v2.0, set the visual sample entry to `avc3` or `hev1` as needed.

Non-SDR- or non-HDR-compliant single-layer Dolby Vision stream in single track

Set up boxes to signal the single-track, single-layer Dolby Vision stream in which the base layer is neither SDR nor HDR compliant.

- If the single-layer Dolby Vision stream is encoded in an HEVC-compatible elementary stream, include these boxes:
 - DolbyVisionHEV1SampleEntry (dvhe) or DolbyVisionHCV1SampleEntry (dvh1):
 - HEVC configuration box (hvcC).
 - Dolby Vision configuration box (dvcC or dvvC).
- If the single-layer Dolby Vision stream is encoded in an AVC-compatible elementary stream, include these boxes:
 - DolbyVisionAVC1SampleEntry (dva1) or DolbyVisionAVC3SampleEntry (dvav):
 - AVC configuration box (avcC).
 - Dolby Vision configuration box (dvcC or dvvC).
- In the Dolby Vision configuration box (dvcC or dvvC), set these fields:
 - Set the rpu_present_flag field to 1.
 - Set the el_present_flag field to 0.
 - Set the bl_present_flag field to 1.
 - Set the dv_profile field according to the encoded Dolby Vision profile. For valid values for this field, see *Dolby Vision profiles and levels*.
 - Set the dv_level field according to the encoded Dolby Vision level. For valid values for this field, see *Dolby Vision profiles and levels*.
- In the handler reference box, set the handler_type field to vide.
- Make sure that the media information header box contains a video media header box.

The locations and hierarchy of the boxes that must be included in the stbl box to signal the single-track Dolby Vision stream within an ISO base media file are listed in the table.

Table 3: Sample table box hierarchy for a single-track, single-layer Dolby Vision file with non-SDR or -HDR compliant base layer

Nesting level				Reference
4	5	6	7	
stbl				ISO/IEC 14496-12
	stsd			
		One of: <ul style="list-style-type: none"> • dvav • dva1 • dvhe • dvh1 		
			One of: <ul style="list-style-type: none"> • avcC • hvcC 	
			One of: <ul style="list-style-type: none"> • dvcC • dvvC 	Dolby Vision configuration box

Table 3: Sample table box hierarchy for a single-track, single-layer Dolby Vision file with non-SDR or -HDR compliant base layer (continued)

Nesting level				Reference
4	5	6	7	
	stts			ISO/IEC 14496-12
	stsc			
	stsz			
	stz2			
	stco			
	co64			

3.2.2 Dual-layer Dolby Vision stream

The base-layer, enhancement-layer, and reference-picture-unit substreams are combined into a single video elementary stream (AVC or HEVC) for transmission on a single ISO base media file track.

Note that dual layer is required by Dolby Vision profile 4 only, and for certain optional use cases of profile 7.

With regards to profile 4 dual-layer application, these notes apply:

- A profile 4 bitstream with a minimal enhancement layer (MEL) is a constrained version of the original profile 4 bitstream. It produces a high dynamic range Dolby Vision video signal on both older and new Dolby Vision certified devices. An original profile 4 bitstream with a full enhancement layer distributed after 31 December, 2017, may not produce the high dynamic range Dolby Vision video signal on all Dolby Vision devices.
- A new Dolby Vision certified device is able to decode a profile 4 MEL bitstream without instantiating a secondary HEVC decoder for the enhancement layer.
- A new Dolby Vision device that chooses not to instantiate a second HEVC decoder and supports profile 4 must distinguish the original profile 4 bitstream from the profile 4 MEL bitstream.

For more information, see the *Notes to profiles* and *Annex II* sections of the *Dolby Vision Profiles and Levels*, v1.3.1.1.

SDR- or HDR-compliant dual-layer Dolby Vision stream in single track

Set up boxes to signal the single-track, dual-layer Dolby Vision stream that contains the SDR- or HDR-compliant base layer.

- If the dual-layer Dolby Vision stream is encoded in an HEVC-compatible elementary stream, include these boxes:
 - HEVCSampleEntry (hev1 or hvc1):
 - HEVC configuration box (hvcC)
 - Dolby Vision configuration box (dvcC or dvvC)
 - Dolby Vision enhancement-layer HEVC configuration box (hvCE)
- If the dual-layer Dolby Vision stream is encoded in an AVC-compatible elementary stream, include these boxes:
 - DolbyVisionAVCCompatibleSampleEntry (avc1 or avc3) or AVC2SampleEntry (avc2 or avc4):
 - AVC configuration box (avcC)
 - Dolby Vision configuration box (dvcC or dvvC)
 - Dolby Vision enhancement-layer AVC configuration box (avCE)
- In the Dolby Vision configuration box (dvcC or dvvC), set these fields:

- Set the `rpu_present_flag` field to 1.
- Set the `el_present_flag` field to 1.
- Set the `bl_present_flag` field to 1.
- Set the `dv_profile` field according to the encoded Dolby Vision profile. For valid values for this field, see *Dolby Vision profiles and levels*.
- Set the `dv_level` field according to the encoded Dolby Vision level. For valid values for this field, see *Dolby Vision profiles and levels*.

The locations and hierarchy of the boxes that must be included in the `stbl` box to signal the single-track Dolby Vision stream within an ISO base media file are listed in the table.


 **Note:** This table does not list the complete structure of the ISO base media file, which begins with nesting level 0.

Table 4: Sample table box hierarchy for a single-track, dual-layer Dolby Vision file with SDR- or HDR-compliant base layer

Nesting level				Reference
4	5	6	7	
stbl				ISO/IEC 14496-12
	stsd			
		One of: <ul style="list-style-type: none"> • avc1 • avc3 • avc2 • avc4 • hev1 • hvc1 		
			One of: <ul style="list-style-type: none"> • avcC • hvcC 	
			One of: <ul style="list-style-type: none"> • dvcC • dvvC 	Dolby Vision configuration box
			One of: <ul style="list-style-type: none"> • hvcE • avcE 	
	stts			ISO/IEC 14496-12
	stsc			
	stsz			
	stz2			
	stco			
	co64			

If you need the ISO base media file to be compliant with DECE CFF v2.0, set the visual sample entry to `avc3` or `hev1` as needed.

4

Annex

- [Not supported for new applications: Dolby Vision dual-track ISO base media file](#)
- [Constraints on the ISO base media file](#)

4.1 Not supported for new applications: Dolby Vision dual-track ISO base media file

As Dolby Vision profile 4 is not supported for new applications by service providers, profile 7 is currently the only Dolby Vision profile with dual layers. However, Blu-ray dual-layer application of profile 7 uses transport streams rather than the ISO base media file format container. Dual-track ISO base media files are not supported for new Dolby Vision applications.

As originally designed, dual-layer Dolby Vision streams can be multiplexed and transported on two separate tracks in an ISO base media file, with the base-layer substream on one track, and the enhancement-layer and reference-picture-unit substreams packaged together on another track. Each track has its own sample description table. The base-layer track can be either SDR compliant or HDR compliant.

4.1.1 SDR- or HDR-compliant base-layer Dolby Vision track

If the Dolby Vision base-layer track is SDR or HDR compliant, signal the track as a regular AVC or HEVC video track.

Set the visual sample entry to `avc3` or `hev1` to be compliant with DECE CFF v2.0.

Set up boxes for the enhancement layer as specified in *Enhancement-layer Dolby Vision track*.

Note that single-track ISO base media file streams are preferred for Dolby Vision profile 4.

Related information

[Enhancement-layer Dolby Vision track](#) on page 24

4.1.2 Enhancement-layer Dolby Vision track

The enhancement-layer track is not SDR and HDR compliant. Configure box fields to signal the enhancement-layer track.

For the enhancement-layer track of a dual-track Dolby Vision stream:

- If the dual-track Dolby Vision stream is encoded in an HEVC-compatible elementary stream, include these boxes:
 - `DolbyVisionHVC1SampleEntry` (`dvh1`) or `DolbyVisionHEV1SampleEntry` (`dvhe`)
 - HEVC configuration box (`hvcC`)
 - Dolby Vision configuration box (`dvcC` or `dvvC`)
- If the dual-track Dolby Vision stream is encoded in an AVC-compatible elementary stream, include these boxes:
 - `DolbyVisionAVC3SampleEntry` (`dvav`) or `DolbyVisionAVC1SampleEntry` (`dva1`)
 - AVC configuration box (`avcC`)
 - Dolby Vision configuration box (`dvcC` or `dvvC`)
- In the Dolby Vision configuration box (`dvcC` or `dvvC`), set these fields:
 - Set the `rpu_present_flag` field to 1.
 - Set the `el_present_flag` field to 1.
 - Set the `bl_present_flag` field to 0.
 - Set the `dv_profile` field according to the encoded Dolby Vision profile. For valid values for this field, see *Dolby Vision profiles and levels*.
 - Set the `dv_level` field according to the encoded Dolby Vision level. For valid values for this field, see *Dolby Vision profiles and levels*.
- In the handler reference box, set the `handler_type` field to `vide`.
- Make sure that the media information header box contains a video media header box.

- In the track reference box (trf), set the reference_type field to vdep.

Note: The Dolby Vision enhancement-layer AVC or HEVC configuration box (avcE or hvcE) must not be present in the dual-track Dolby Vision stream.

The locations and hierarchy of the boxes that must be included in the stbl box to signal the single-track Dolby Vision stream within an ISO base media file are listed in the table.

Table 5: Sample table box hierarchy for the enhancement-layer track of a dual-track Dolby Vision file

Nesting level				
4	5	6	7	
stbl				ISO/IEC 14496-12
	stsd			
		One of: <ul style="list-style-type: none"> • dvav • dva1 • dvhe • dvh1 		
			One of: <ul style="list-style-type: none"> • avcC • hvcC 	
			One of: <ul style="list-style-type: none"> • dvcC • dvvC 	Dolby Vision configuration box
	stts			ISO/IEC 14496-12
	stsc			
	stsz			
	stz2			
	stco			
	co64			

Related information

[Dolby Vision configuration boxes](#)

[Dolby Vision enhancement-layer AVC and HEVC configuration box](#)

4.2 Constraints on the ISO base media file

An ISO base media file that carries the Dolby Vision stream on two tracks must meet certain conditions to ensure the correct operation of a downstream Dolby Vision decoding device.

4.2.1 Constraints on movie fragments

For an ISO base media file that carries the Dolby Vision stream on two separate tracks, constraints on the movie fragments must be met.

- Enhancement-layer and base-layer samples must be placed in separate movie fragments. When interleaved, each base-layer movie fragment must be immediately followed by an enhancement-layer

movie fragment. The adjacent movie fragments (consisting of moof and mdat) must have the same number of samples with identical composition time stamps.

- The track fragment run box (trun) for the base-layer and enhancement-layer tracks must contain the same number of samples.

4.2.2 Constraints on the track fragment random-access box

The track fragment random access box (tfra) for the base-layer and enhancement-layer tracks must conform to ISO/IEC 14496-12 and must meet an additional constraint.

The value of the time field in the track fragment random-access box indicates the presentation time of a random accessible sample. This time value must be identical for every corresponding randomly accessible sample in the base-layer and enhancement-layer track.

Glossary

AVC

Advanced Video Coding. See [H.264](#).

HEVC

High-Efficiency Video Coding. See [H.265](#).

MEL

Minimal enhancement layer.

NAL

Network Abstraction Layer.

SDR

Standard dynamic range. A Rec. 709 signal with peak luminance of 100 cd/m².

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